

# Developing Biological Goals for the Bay-Delta Plan

A joint presentation to the Delta Science Program Independent  
Scientific Advisory Panel by

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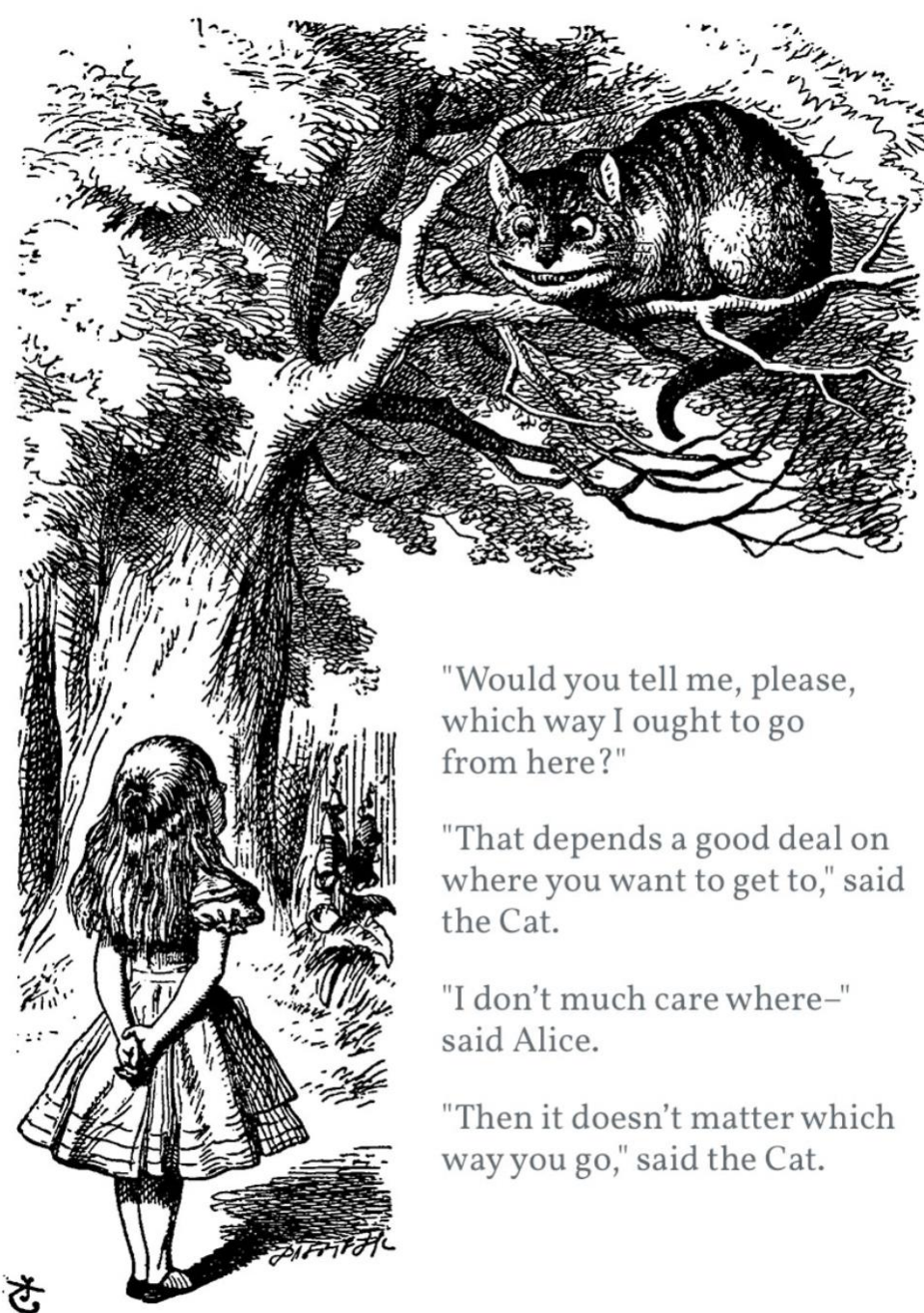
Julie Zimmerman, The Nature Conservancy

Rene Henery, Trout Unlimited

Jon Rosenfield, San Francisco Baykeeper

March 4, 2019





"Would you tell me, please,  
which way I ought to go  
from here?"

"That depends a good deal on  
where you want to get to," said  
the Cat.

"I don't much care where—"   
said Alice.

"Then it doesn't matter which  
way you go," said the Cat.

"Would you tell me please, which  
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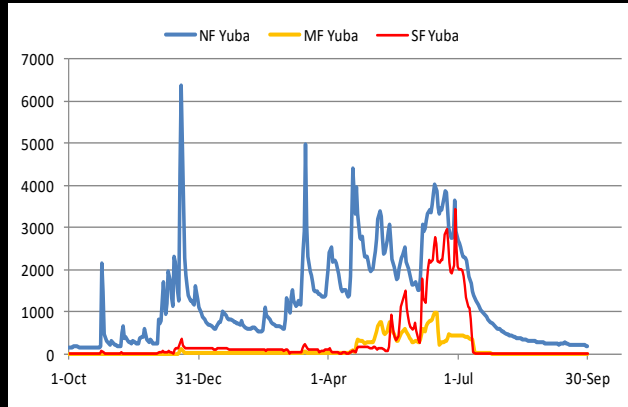
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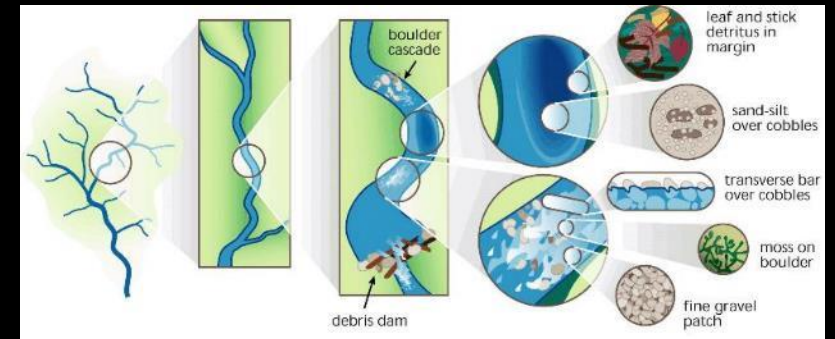
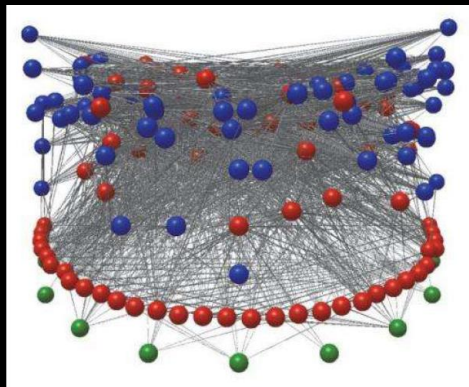
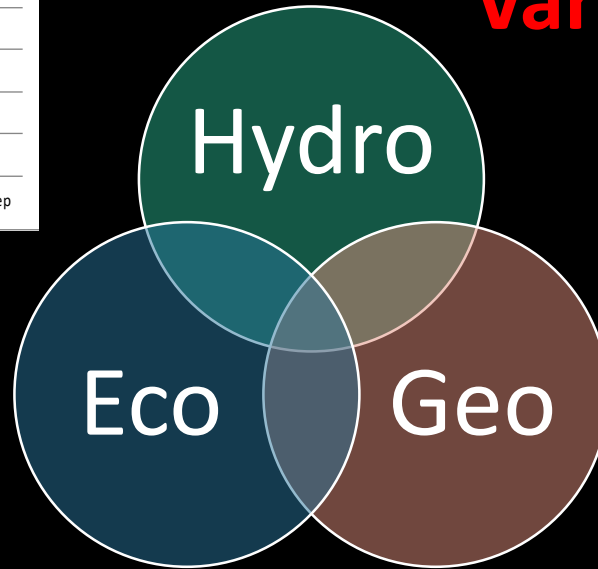
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# What science tells us

## Aquatic ecology is complicated!



**All interact and  
vary through time**



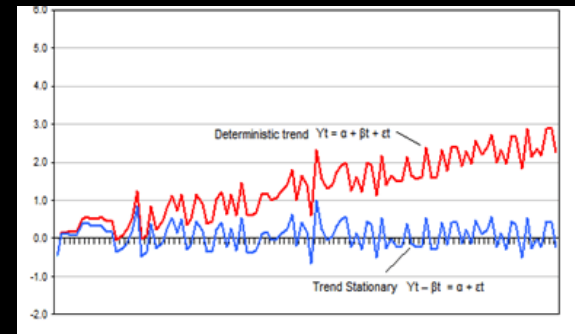
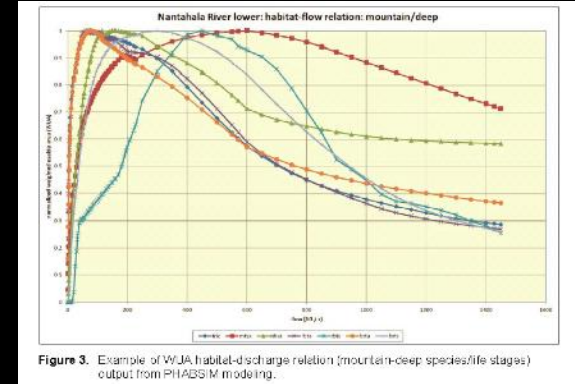
# What managers want

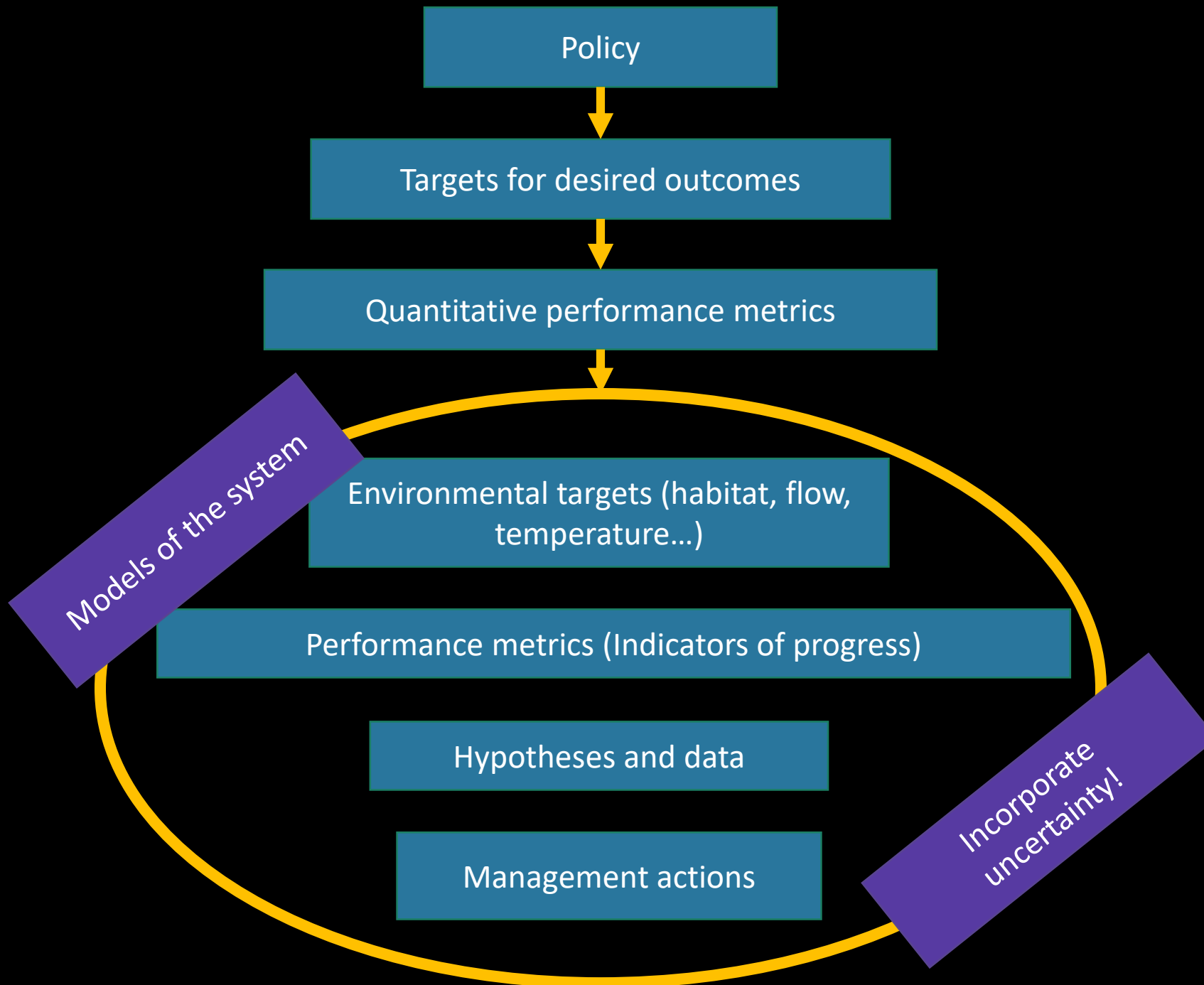
- A Number!
- But they might live with a set of numbers

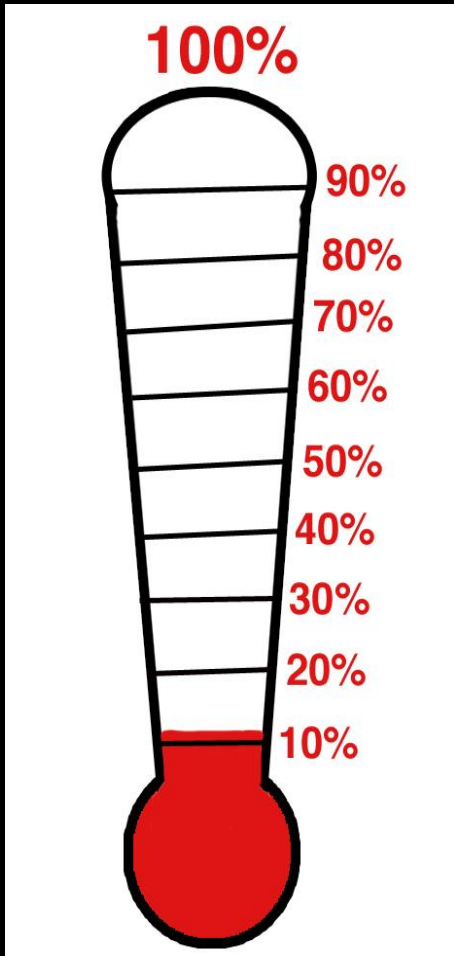
Merced River, CA recommended flow (cfs)					
Date	Critical	Dry	BN	AN	Wet
Oct 1-14	200	225	250	275	300
Oct 15-Dec 31	250	275	300	325	350
Jan 1-Mar 31	200	250	300	375	350
Apr 1-May 31	300	350	400	350	500
Jun 1-Sep 30	200	200	250	300	350

# So what's the problem?

- What does it mean to sustain ecological outcomes?
- How do we choose from 100's of metrics?
- How do we handle temporal and spatial variability?
- How do we consider multiple species?
- How do we account for shifting baselines?
- Do we analyze trade-offs among competing objectives?







# Desired Outcomes

## Drive Goal and Target Development

- Goals are broad narrative descriptions of desired outcomes, based on law and policy
- Targets are clear, quantitative articulations of goals that are SMART (specific, measurable, attainable, relevant, and timebound)
- Goals and targets should not be based on particular hypotheses, solution pathways or monitoring regimes
- The WQCP sets ecosystem goals; meeting them depends largely but not exclusively on species targets that are diverse in hierarchical/life history/spatial-temporal characteristics and also on multi-metric approaches

Policy

Policy Goal: doubling of  
natural production of  
chinook salmon from the  
average production of  
1967-1991

Targets for desired outcomes



Target: Ensure sufficient  
spawning and rearing  
habitat to support  
number of juveniles  
needed to attain ocean  
production target [ Policy Goal]

Target: Ensure juvenile  
freshwater survival  
necessary to produce  
population growth at a  
rate consistent with  
attainment of ocean  
production target [Policy  
Goal]

Policy

Policy Goal: protect  
the public trust  
resources of the Bay-  
Delta ecosystem

Targets for desired outcomes

Target: frequency  
distribution of

- starry flounder Age 1 + abundance
- splittail Age 0 catch-per-trawl
- delta smelt recruit-per-stock (age 0/preceding age 1)



# Key points

- Targets, performance metrics, indicators of progress toward targets, and models of the system should be treated separately and hierarchically
- Targets should represent desired outcomes – how do we describe the ecological condition that we want to achieve and how will we measure it?
- Models should link actions to performance metrics and represent hypotheses, uncertainty, processes that mitigate relationships between actions and outcomes
- Models predict consequences and trade-offs of actions on metrics of desired ecological condition

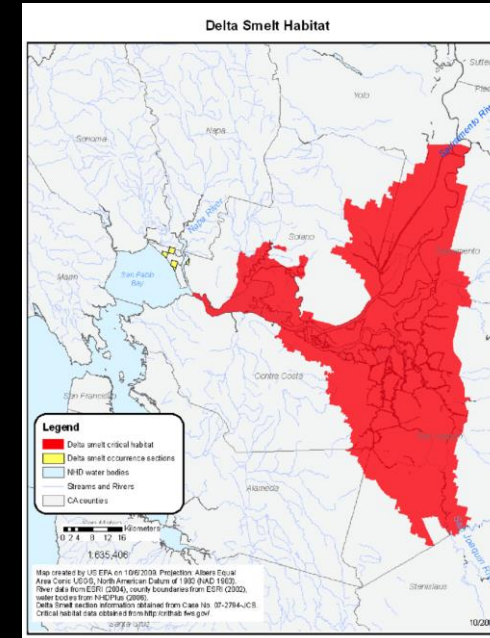
# Target Dos and Don'ts

- **Targets should be identified independent of our current monitoring capacity**
  - Our existing monitoring programs are the expression of a mode of management that is focused on abundance in the short term as opposed to resilience, **have led to species decline, and are perpetuating it.**
  - Existing monitoring programs collect many useful data points but not all that are **necessary** to transition to a management approach focused on achieving long term, resilience.
  - **Targets should be defined independent of the current monitoring program.** The tools/ data from the current monitoring program can then be repurposed to address those objectives and gaps/ additional data needs identified.



# Target Dos and Don'ts

- **Targets should include outcomes related to habitat condition/ quality and spatial extent**
  - **Voluntary agreements are being negotiated as a combination of water and habitat actions that create benefit for target species and or ecological function (e.g. food production for species) via a combined effect on the temporal and spatial availability of suitable habitat conditions.**
  - **WQCP targets would need to quantify those conditions for suitability and the temporal and spatial extent necessary in order to effectively compare alternatives with and without new habitat.**



# Target Dos and Don'ts

- **Species-specific targets are critical AND community, assemblage, or ecosystem targets should have transparent rationale**
  - **Current policy is primarily focused on target species**, thus targets that can be used to measure success for those species independently are essential.
  - **Indicators or metrics** designed to address ecosystem, community, and or species assemblages are generally either:
    - **habitat conditions/ attributes** that emerge as important to multiple species,
    - conditions believed to **represent some reference state** with which multiple species co-evolved, or
    - some combination of the above.
  - In order to be effective both as targets and in application as testable hypotheses to guide adaptive management, **the rationale** and conceptual model related to mechanism underlying these broader target categories needs to be stated explicitly.



